

CLAIMS

1. A coupling for a containment system for fluids at pressures in excess of 15,000psi, providing for a gasketless seal between adjacent bodies of like material, the adjacent bodies being aligned along a coupling axis, the coupling comprising:

a tapered female mouth integrally formed on one of the adjacent bodies, the tapered female mouth having a female mating portion; and

a tapered male mouth integrally formed on the other of the adjacent bodies, the tapered male mouth having a male mating portion sized to contact the tapered female portion; wherein

one of the mating portions has a substantially linear cross-sectional profile, the linear cross-sectional profile being angled between 40 and 68 degrees from the coupling axis; and

the other of the mating portions has a convex, curved cross-sectional profile, the curved cross-sectional profile forming a substantially circular seal when urged into contact with the linear cross-sectional profile.

2. The coupling of claim 1 wherein the linear cross-sectional profile is on the tapered female mouth and the curved cross-sectional profile is on the tapered male mouth.

3. The coupling of claim 1 wherein the linear cross-sectional profile is angled between 50 and 59 degrees from the coupling axis.

4. The coupling of claim 1 wherein the linear cross-sectional profile is angled approximately 54 degrees from the coupling axis.

5. The coupling of claim 1 wherein the curved cross-sectional profile is substantially arcuately shaped.

6. The coupling of claim 1 wherein the curved cross-sectional profile is substantially elliptically shaped.

7. The coupling of claim 1 wherein the tapered female mouth is radially symmetric about the coupling axis.

8. The coupling of claim 1 wherein the tapered male mouth is radially symmetric about the coupling axis.

9. A fitting formed of a metallic material for sealing a fluid at a pressure greater than or equal to 15,000psi in a vessel of a like metallic material, without requiring a gasket therebetween, the vessel having a tapered mouth for engaging the fitting along a coupling axis, the fitting comprising:

a tapered engagement portion shaped to sealingly contact the tapered mouth in a circular seal, the circular seal having a tangential contact angle measuring between 40 and 68 degrees from the coupling axis.

10. The fitting of claim 9 wherein the engagement portion has a convex, curved cross-sectional profile for engagement with a tapered mouth having a linear cross-sectional profile.

11. The fitting of claim 9 wherein the engagement portion has a convex, curved cross-sectional profile for engagement with a tapered mouth having a linear cross-sectional profile, the curved cross-sectional profile being substantially arcuately shaped.

12. The fitting of claim 9 wherein the engagement portion has a convex, curved cross-sectional profile for engagement with a tapered mouth having a linear cross-sectional profile, the curved cross-sectional profile being substantially elliptically shaped.

13. The fitting of claim 9 wherein the engagement portion has a linear cross-sectional profile for engagement with a tapered mouth having a convex, curved cross-sectional profile.

14. The fitting of claim 9 wherein the tangential contact angle is between 50 and 59 degrees from the coupling axis.

15. The fitting of claim 9 wherein the tangential contact angle is approximately 54 degrees from the coupling axis.

16. The fitting of claim 9 wherein the engagement portion of the fitting is radially symmetric with respect to the coupling axis.

17. A vessel formed of a metallic material for containing a fluid at a pressure greater than or equal to 15,000psi, the vessel being sealed by a fitting of a like metallic material, without requiring a gasket therebetween, the fitting having a tapered mouth for engaging the vessel along a coupling axis, the vessel comprising:

a tapered engagement portion shaped to sealingly contact the tapered mouth in a circular seal, the circular seal having a tangential contact angle measuring between 40 and 68 degrees from the coupling axis.

18. The vessel of claim 17 wherein the engagement portion has a convex, curved cross-sectional profile for engagement with a tapered mouth having a linear cross-sectional profile.

19. The vessel of claim 17 wherein the engagement portion has a convex, curved cross-sectional profile for engagement with a tapered mouth having a linear cross-sectional profile, the curved cross-sectional profile being substantially arcuately shaped.

20. The vessel of claim 17 wherein the engagement portion has a convex, curved cross-sectional profile for engagement with a tapered mouth having a linear cross-sectional profile, the curved cross-sectional profile being substantially elliptically shaped.

21. The vessel of claim 17 wherein the engagement portion has a linear cross-sectional profile for engagement with a tapered mouth having a convex, curved cross-sectional profile.

22. The vessel of claim 17 wherein the tangential contact angle is between 50 and 59 degrees from the coupling axis.

23. The vessel of claim 17 wherein the tangential contact angle is approximately 54 degrees from the coupling axis.

24. The vessel of claim 17 wherein the engagement portion of the fitting is radially symmetric with respect to the coupling axis.

25. A method for forming a fluid-tight, gasketless seal in an ultrahigh pressure fluid containment system, the method comprising:

providing a first component with an engagement portion having a linear cross-sectional profile;

abutting a second component having an engagement portion against the first component with the respective engagement portions in contact with each other, the engagement portion of the second component having a curved cross-sectional profile such that the contacting surface between the components is circular; and

urging the first and second components against each other.